

CLAIMS

We claim:

1. A fuel cell system, comprising:

a fuel gas supply line that supplies fuel gas from a fuel gas supply source to
5 the fuel cell;

pressure-regulating means provided on the fuel gas supply line and for
regulating a pressure of the fuel gas supplied from the fuel gas supply source; and

a circulation route that returns the fuel gas discharged from the fuel cell to the
fuel gas supply line,

10 wherein the circulation route is connected to the fuel gas supply line such
that the fuel gas is returned to the fuel gas supply line in upstream of the
pressure-regulating means.

2. The fuel cell system according to claim 1, wherein the pressure-regulating
means is configured so as to regulate the pressure of the fuel gas in the fuel gas
15 supply line by using a pressure of oxidation gas supplied to the fuel cell, the fuel cell
system further comprising:

an oxidation gas supply line for supplying the oxidation gas supplied to a
cathode of the fuel cell;

oxidation gas supply means provided in the oxidation gas supply line and for
20 pressurizing and supplying the oxidation gas to the cathode;

cathode side pressure detection means for detecting the pressure of the
oxidation gas supplied to the cathode of the fuel cell;

anode side pressure detection means for detecting the pressure of the fuel
gas supplied to an anode of the fuel cell; and

25 control means for controlling the pressure of gas supplied to the fuel cell from
at least either the fuel gas supply line and the oxidation gas supply line, so that the

differential pressure between the oxidation gas detected by the cathode side pressure detection means and the fuel gas detected by the anode side pressure detection means becomes within a predetermined range.

3. The fuel cell system according to claim 2, wherein the control means controls
5 at least either one of the oxidation gas supply means or the pressure-regulating means so that the differential pressure becomes within the predetermined range.

4. The fuel cell system according to claim 1 or 2, further comprising flowing means for flowing the fuel gas of the circulation route into the fuel gas supply line.

5. The fuel cell system according to claim 4, wherein the flowing means is a fuel
10 gas pump.

6. The fuel cell system according to claim 4, wherein the flowing means is an ejector.

7. The fuel cell system according to claim 2, wherein the cathode side pressure detection means estimates and detects the pressure of the oxidation gas on the basis
15 of a drive amount of the oxidation gas supply means.

8. The fuel cell system according to claim 4, wherein the anode side pressure detection means estimates and detects the pressure of the fuel gas on the basis of a drive amount of the flowing means.

9. The fuel cell system according to claim 3, further comprising oxidation gas
20 pressure-regulating means which is capable of controlling the pressure of the oxidation gas supplied to the pressure-regulating means independently from the oxidize gas in the cathode side,

wherein when the pressure of the fuel gas is larger than the pressure of the oxidation gas, and the differential pressure therebetween is outside the
25 predetermined range, the oxidation gas pressure-regulating means depressurizes the oxidation gas supplied to the pressure-regulating means, as a result of which the fuel

gas in the anode side, which is regulated by the pressure-regulating means, is depressurized, whereby the differential pressure is reduced.

10. The fuel cell system according to claim 3, wherein when the pressure of the fuel gas is larger than the pressure of the oxidation gas, and the differential pressure therebetween is outside the predetermined range, the oxidation gas supply means pressurizes the oxidation gas supplied to the cathode side to reduce the differential pressure.

11. The fuel cell system according to claim 3, further comprising purge means for purging the fuel gas in the circulation route,

10 wherein when the pressure of the fuel gas is larger than the pressure of the oxidation gas, and the differential pressure therebetween is outside the predetermined range, the purge means depressurizes the fuel gas in the anode side to reduce the differential pressure.

12. The fuel cell system according to claim 3, further comprising oxidation gas pressure-regulating means that is capable of controlling a pressure of the oxidation gas supplied to the pressure-regulating means independently from the oxidize gas in the cathode side,

20 wherein when the pressure of the oxidation gas is larger than the pressure of the fuel gas, and the differential pressure therebetween is outside the predetermined range, the oxidation gas pressure-regulating means pressurizes the oxidation gas supplied to the pressure-regulating means, as a result of which the fuel gas in the anode side, which is regulated by the pressure-regulating means, is pressurized, whereby the differential pressure is reduced.

13. The fuel cell system according to claim 3, wherein when the pressure of the oxidation gas is larger than the pressure of the fuel gas, and the differential pressure therebetween is outside the predetermined range, the oxidation gas supplied to the

cathode side is depressurized by the oxidation gas supply means so that the differential pressure is reduced.

14. A fuel cell system, comprising:

an oxidation gas supply line for supplying oxidation gas supplied to a cathode
5 of the fuel cell;

oxidation gas supply means provided in the oxidation gas supply line and for
pressurizing and supplying the oxidation gas to the cathode;

cathode side pressure detection means for detecting a pressure of the
oxidation gas supplied to the cathode of the fuel cell;

10 anode side pressure detection means for detecting a pressure of the fuel gas
supplied to an anode of the fuel cell; and

control means for controlling the pressure of gas supplied to the fuel cell from
at least either the fuel gas supply line and the oxidation gas supply line, so that the
differential pressure between the oxidation gas detected by the cathode side
15 pressure detection means and the fuel gas detected by the anode side pressure
detection means becomes within a predetermined range.

15. The fuel cell system according to claim 14, wherein the control means
controls at least either one of the oxidation gas supply means or the
pressure-regulating means so that the differential pressure becomes within the
20 predetermined range.

16. The fuel cell system according to claim 14 or 15, further comprising flowing
means for flowing the fuel gas of the circulation route into the fuel gas supply line.